Society of Medical Education & Research

2021, Volume 1, Page No: 16-24

Annals of Pharmacy Education, Safety, and Public Health Advocacy Specialty

National Survey: Understanding, Perspectives, and Practices Regarding COVID-19 among Pharmacy Students in Iraq

Haydar Al-Tukmagi[1], Omer Qutaiba Baderaldeen Allela[2]*, Hayder Adnan Fawzi[3], Dur Haider Fakhri[4]

[1]Department of Pharmacy, Baghdad College of Medical Sciences, Baghdad, Iraq.
[2]Department of Pharmacy, Al-Noor University College, Bartela, Iraq.
[3]Department of Pharmacy, Al-Rasheed University College, Baghdad, Iraq.
[4]Department of Medicine, Madain General Hospital, Baghdad, Iraq.

***E-mail** ✉ Omerallela@alnoor.edu.iq

Abstract

The emergence of the COVID-19 virus has swiftly escalated into a significant public health issue, severely affecting healthcare systems and imposing economic challenges. This study assessed the awareness, attitudes, and knowledge of pharmacy students in Iraq regarding the COVID-19 infection. As a population-based cross-sectional study, this study involved pharmacy students nationwide, utilizing an online questionnaire distributed electronically. The sample consisted of 907 students, with 609 females (67.1%) and 298 males (32.9%), representing a gender ratio of 2:1. The largest group was comprised of fifth-year students, totaling 275 (30.3%). Overall, 81.1% of participants were aware of COVID-19 before the outbreak, with similar levels of awareness across different academic years (P-value = 0.160). The primary source of information was social media, cited by 52% of students, followed by the World Health Organization (WHO) website at 25.8%. Notably, students in lower years were less likely to rely on WHO as a source. A significant portion of students (61%) believed that COVID-19 was already spreading in Iraq 1-2 months before the survey, while 29.2% only started to acknowledge it within the past two weeks. Regarding preventive measures, 89.1% of students felt that following guidelines could help prevent infection, and 86.0% believed that infection control in healthcare settings could reduce transmission. The findings suggest that pharmacy students possess a solid understanding of the medical aspects of COVID-19 and demonstrate good knowledge of the virus itself. However, they expressed dissatisfaction with the institutions' efforts to reduce the spread of infection.

Keywords: Students, Pharmacist, WHO guidelines, Questionnaire, Electronic

Introduction

The emergence of the COVID-19 virus has swiftly escalated into a significant public health issue, impacting healthcare systems greatly and presenting substantial economic challenges. Coronaviruses are known as significant pathogens in animals and, more recently, in humans, primarily spreading through human interactions.

Access this article online

Website: https://smerpub.com/ **E-ISSN: 3108-4850**

Received: 26 March 2021; **Revised:** 03 June 2021; **Accepted:** 06 June 2021

How to cite this article: Al-Tukmagi H, Allela OQB, Fawzi HA, Fakhri DH. National Survey: Understanding, Perspectives, and Practices Regarding COVID-19 among Pharmacy Students in Iraq. Ann Pharm Educ Saf Public Health Advocacy Spec. 2021;1:16-24. https://doi.org/10.51847/JWcEPCskLN

In late 2019, a series of severe pneumonia cases were reported, originating from Wuhan, China, which quickly proliferated across the globe, leading to a pandemic. In February 2020, the World Health Organization (WHO) officially named the disease COVID-19, signifying "coronavirus disease 2019."

COVID-19 belongs to the beta-coronavirus family, sharing a subgenus with the SARS virus, though it is classified in a different clade. Meanwhile, MERS virus, another member of the beta-coronavirus family, is considered more distantly related. The closest genetic similarities have been identified between COVID-19 and two coronaviruses found in bats, indicating that bats may be the source; however, it remains unclear whether the

virus is transmitted from bats or through another intermediary host [1-6].

Globally, over 10 million COVID-19 infections have been documented, though some estimates suggest that the true number of cases could be up to ten times higher than reported figures. The primary mode of transmission for the virus is direct person-to-person contact, which is thought to occur primarily through close interactions, particularly via respiratory droplets that can travel approximately 2 meters [7-10].

In this study, we focused on assessing the awareness, attitudes, and knowledge of pharmacy students in Iraq regarding the COVID-19 infection.

Materials and Methods

Study design

Conducted in March 2020 during a strict lockdown in Iraq aimed at enforcing social distancing measures to curb the virus's spread, this was a population-based cross-sectional research involving pharmacy students from across the nation. An online questionnaire was utilized for this research, created using Google Forms. The generated link was disseminated through the Facebook group of the Iraqi pharmacist's syndicate to reach participants.

Sample size calculation

We determined a total sample size of 817 students, considering a power of 80%, a confidence level of 95%, a relative precision of 7%, and a prevalence rate of 50% (anticipated response rate). The estimated sample size was calculated using the following formula:

$$n = \frac{4\,p.q}{d^2} \quad (1)$$

Where p is the prevalence, q is (1–p), and d is relative precision.

Participants

We initially gathered responses from 1,189 participants. Following the removal of incomplete submissions, the final sample consisted of 907 students, exceeding the minimum required sample size of 817. The participants included in the study fulfilled the inclusion criteria, having experienced exposure to the virus during the recent COVID-19 outbreak in the country.

Data collection

The data were obtained through a 40-item online questionnaire designed to assess three key areas: (1) understanding of virology, transmission mechanisms, treatment approaches, and epidemiology; (2) attitudes toward infectivity, compliance with guidelines, prevention of transmission, and vaccination; and (3) practices related to the treatment and prevention of COVID-19.

Questionnaire design

The survey instrument was developed using insights from a comprehensive review of the literature and course materials provided by WHO on emerging respiratory diseases, including COVID-19. Validation of the questionnaire followed a two-step process [10]. In the first phase, its clarity and relevance to the study objectives were reviewed by an experienced educationist and a graduate pharmacist with expertise in pharmacy and medicine [11, 12]. The second phase involved a pilot study with 12 students, who offered feedback on simplifying and shortening the questionnaire. Suggestions from participants were incorporated to enhance the questionnaire while maintaining alignment with existing literature. After detailed deliberations, the authors finalized the questionnaire, which was then disseminated to participants for data collection.

Cronbach's alpha was utilized to evaluate test-retest reliability [13-17], yielding a value of 0.947. It should be noted that the data from the pilot study were excluded from the final analysis [18].

Demographic data

This section examined various participant characteristics, including their age, gender, academic grade, knowledge regarding COVID-19, sources of information, and place of residence.

The domain of the questionnaire

The section consists of 18 items, whereas the attitude domain includes 10 items, and the practice section comprises 10 items.

Statistical analysis

Discrete variables were reported as frequencies and percentages. Reliability was evaluated using Cohen's kappa test and Cronbach's alpha. The statistical analysis

was conducted with the SPSS 22 software package (Chicago, IL). A P-value < 0.05 was deemed statistically significant.

Data availability

Zenodo: Information on the evaluation of Iraqi pharmacy students' perspectives on COVID-19 [19].

This project includes the following core data:

- A questionnaire assessing Iraqi pharmacy students' information, attitude, and practice regarding COVID-19 [10].
- Extended Data File data setting.xlsx, which contains raw data from 15 students who participated in the pilot study [18].
- Extended Data File data setting.xlsx, featuring raw data from all 907 pharmacy students [19].

The data can be accessed under the Creative Commons Attribution 4.0 International license.

Results and Discussion

The study involved 907 pharmacy students, consisting of 609 females (67.1%) and 298 males (32.9%), with a gender ratio of 2:1. The majority of participants were in the fifth year, comprising 275 students (30.3%), followed by the third year with 196 students (21.6%), the second year with 160 students (17.6%), the fourth year with 156 students (17.2%), and finally, the first year with 120 students (13.2%).

Students general knowledge and awareness

A total of 81.1% of students were aware of COVID-19 before the outbreak, with this awareness being consistent across all academic levels (P-value = 0.160). The most frequent channel of information was social media (52%), followed by the WHO website (25.8%), with lower-grade students relying less on the WHO site.

Regarding basic virology and epidemiology, the vast majority of students (99.1%) recognized COVID-19 as a viral infection. A significant portion (62.3%) understood the source of the virus's name, 93.6% were aware of how it spreads, and 87.1% knew the country where the outbreak originated.

In clinical terms, 71.1% of students were knowledgeable about the virus's lifespan on surfaces and in the air, and 93.7% were familiar with the symptoms. However, only 62% were aware that diarrhea could be a symptom in addition to respiratory manifestations. Lastly, 91.7% had information about the incubation period of the virus (1-14 days).

Regarding the treatment aspect of COVID-19, 96.4% of students were aware that no vaccine was currently available, while 77.7% knew there was no existing treatment for the disease. Additionally, 68.4% believed that home remedies or herbs were not effective for treating COVID-19 infection.

When it came to prevention knowledge, the majority (85.2%) considered studying more to be the best preventive measure. 87.7% thought that 70% alcohol was the most effective surface disinfectant, while 95.8% believed that individuals with chronic diseases were at higher risk for severe COVID-19, and 96.6% felt that healthcare workers were particularly vulnerable to serious infection. Furthermore, 95.9% of students believed that COVID-19 infection could be fatal.

Most students (61%) thought that COVID-19 had been present in Iraq 1-2 months prior, while 29.2% only came to this belief in the last two weeks, as shown in **Table 1**.

Table 1. Evaluation of students' knowledge

	Response	Number (%)
Do you have enough information about COVID-19?	No	171 (18.9%)
	Yes	736 (81.1%)
Origin of your information about COVID-19?	MOH website	70 (7.7%)
	Friend	21 (2.3%)
	Newsletter	27 (3.0%)
	WHO website	234 (25.8%)
	TV	66 (7.3%)

	Social media	472 (52.0%)
	Electronic resources	5 (0.6%)
	All methods	12 (1.3%)
Are you aware that COVID-19 is caused by a virus?	No	8 (0.9%)
	Yes	899 (99.1%)
Are you familiar with the reason this virus is referred to as a novel coronavirus?	No	343 (37.8%)
	Yes	564 (62.2%)
Are you aware of the origin of the term COVID-19?	No	342 (37.7%)
	Yes	565 (62.3%)
Do you think that COVID-19 spreads through close contact with an infected person or animal?	No	58 (6.4%)
	Yes	849 (93.6%)
In your view, do the majority of infected cases originate from China?	No	117 (12.9%)
	Yes	790 (87.1%)
Are you aware of the exact lifespan of COVID-19 in the air and on various surfaces?	No	257 (28.3%)
	Yes	650 (71.7%)
Are you familiar with the specific signs and symptoms of a COVID-19 infection?	No	57 (6.3%)
	Yes	850 (93.7%)
Were you aware that diarrhea can also be a symptom of COVID-19, in addition to the commonly known respiratory signs of the disease?	No	345 (38.0%)
	Yes	562 (62.0%)
What is the precise incubation period for the virus?	5 days	15 (1.7%)
	1–14 days	832 (91.7%)
	21 days	53 (5.8%)
	> 21 days	7 (0.8%)
Is there a COVID-19 vaccine currently available for use?	No	874 (96.4%)
	Yes	33 (3.6%)
Is there an available treatment for COVID-19 infection on the market?	No	705 (77.7%)
	Yes	202 (22.3%)
Do you think that home remedies or herbal mixtures are effective treatments for COVID-19 infections?	No	620 (68.4%)
	Yes	287 (31.6%)
What is the most effective preventive measure?	Stay home	773 (85.2%)
	Just washing hands with soap	37 (4.1%)
	Just cleaning surfaces with disinfectants	6 (0.7%)
	All	91 (10.0%)
What is the most effective surface disinfectant for COVID-19?	Alcohol more than 70%	788 (87.7%)
	Chloroxylenol B.P. 4.8% w/v	97 (10.8%)
	Povidone iodine 0.5%	14 (1.6%)
	No	38 (4.2%)

Do you believe that individuals with pre-existing chronic conditions are at greater risk of infection?	Yes	869 (95.8%)
Do you believe that healthcare workers face a higher risk of contracting the infection?	No	31 (3.4%)
	Yes	876 (96.6%)
Were you aware that COVID-19 infection has the potential to be fatal?	No	37 (4.1%)
	Yes	870 (95.9%)
When did you come to believe that COVID-19 was a genuine infection in Iraq?	< 2 weeks	265 (29.2%)
	1–2 months	553 (61.0%)
	2–3 months	89 (9.8%)

Student perspectives on COVID-19 infection

Table 2 provides an overview of the students' attitudes toward COVID-19 infection, showing that 86.2% expressed concern about contracting the virus.

Regarding preventive measures, 89.1% of students believed that following guidelines can prevent infection, while 86.0% felt that infection control practices in hospitals could help stop transmission. Additionally, 84.8% indicated they would consider taking the COVID-19 vaccine if it becomes available in the future.

When it comes to treatment, 75.2% thought that intensive care must be given to those diagnosed with the virus, and 96.1% agreed that healthcare workers should enhance their knowledge about COVID-19.

Regarding the information available to the Iraqi public about COVID-19, the majority expressed a neutral stance (40.7%), and 27.5% disagreed that enough information was being provided. Only 33.3% believed the government could control the COVID-19 outbreak, while 32.0% felt that government measures were inadequate. Furthermore, only 58.8% knew the hotline number for COVID-19 inquiries.

Table 2. Evaluation of patients' perspectives on COVID-19 infection

Question	Response	Number (%)
Do you feel concerned about the possibility of yourself, a family member, or a friend contracting the infection?	No	125 (13.8%)
	Yes	782 (86.2%)
Is it possible to prevent the transmission of COVID-19 by following the standard and isolation protocols provided by the Ministry of Health (MOH), WHO, or other recognized organizations?	No	99 (10.9%)
	Yes	808 (89.1%)
Can the active involvement of healthcare workers in hospital infection control programs help lower the prevalence of COVID-19?	No	127 (14.0%)
	Yes	780 (86.0%)
If the COVID-19 vaccine is made available, would you choose to receive it?	No	138 (15.2%)
	Yes	769 (84.8%)
Is intensive treatment necessary for patients who have been diagnosed	No	225 (24.8%)
	Yes	682 (75.2%)
Is it important for healthcare workers to stay well-informed about the virus?	No	35 (3.9%)
	Yes	872 (96.1%)
The amount of information regarding COVID-19 within Iraqi society is adequate.	Strongly disagree	123 (13.6%)
	Disagree	249 (27.5%)
	Neutral	369 (40.7%)
	Agree	133 (14.7%)
	Strongly agree	33 (3.6%)

Are the governmental bodies capable of managing the spread of the infection?	No	605 (66.7%)
	Yes	302 (33.3%)
Do you think the measures implemented by the government to prevent the spread of the infection are sufficient?	No	617 (68.0%)
	Yes	290 (32.0%)
Did you know that the Ministry of Health (MOH) has set up a dedicated hotline for COVID-19-related information?	No	374 (41.2%)
	Yes	533 (58.8%)

A majority of students (92.6%) took steps to prevent COVID-19 infection. In addition, 62.5% stated they would visit a hospital if they developed a fever, and 87.1% would recommend individuals with suspected symptoms to seek hospital care. Furthermore, 93.5% of the students encouraged their family members to follow the WHO guidelines. Approximately half of the students, however, suggested that people rely on social media for information, as shown in **Table 3**.

Table 3. Evaluation of student behaviors regarding COVID-19 infection prevention.

Question	Response	Number (%)
Have you implemented any measures to prevent COVID-19 infection?	No	67 (7.4%)
	Yes	840 (92.6%)
Would you visit a hospital if you developed a fever?	No	341 (37.6%)
	Yes	566 (62.4%)
If someone experiences a fever or other suspected symptoms, would you recommend they visit a hospital?	No	117 (12.9%)
	Yes	790 (87.1%)
How long have you been following these practices?	< 1 months	500 (55.1%)
	1–2 months	407 (44.9%)
Do you recommend that your family, relatives, and friends adhere to the guidance provided by the MOH?	No	59 (6.5%)
	Yes	848 (93.5%)
Do you suggest that people rely on the information they come across on WhatsApp, Facebook, and websites?	No	470 (51.8%)
	Yes	437 (48.2%)
What changes have you made in your behavior or actions to prevent infection?	I stay at home	529 (58.3%)
	I wash my hands with soap and water more often	95 (10.5%)
	Others	283 (31.2%)
What would be your first step if you suspect that a family member, neighbor, or friend might have contracted COVID-19?	Call the hotline number	388 (42.8%)
	Go to the health center	375 (41.3%)
	Others	144 (15.9%)
What measures have you implemented to safeguard your family from COVID-19?	Telling them to stay home	634 (69.9%)
	Telling them about handwashing and hygiene	89 (9.8%)
	Others	184 (20.3%)
What steps can you take to safely assist a neighbor, family member, or friend who may have COVID-19 while awaiting healthcare professionals? What actions can you take?	Keep the person away from others	516 (56.9%)
	Use protective barriers such as gloves and mask	176 (19.4%)
	Others	215 (23.7%)

This study assessed pharmacy students' knowledge, awareness, attitudes, and practices regarding COVID-19 infection in Iraq following the global pandemic. It showed that these students had a high level of understanding and awareness about the disease. To our

knowledge, this is the first research to focus on pharmacy students, both globally and locally.

The findings showed that Iraqi pharmacy students had adequate knowledge of COVID-19 infection, aligning with results from prior research. For example, the study by Al-Mohrej and Agha [20] which surveyed 136 medical students, showed that medical students were well-informed about the disease, including its diagnosis, causes, and treatment—an outcome consistent with our study.

Additionally, research by Al-Mohrej *et al*. [21] that examined over 1,100 general participants from Saudi Arabia on their knowledge of MERS found that more than 90% had some knowledge of the disease and preventive measures, which mirrors our findings.

A study carried out in Saudi Arabia with 200 dental students aimed to evaluate their awareness, knowledge, and attitudes towards MERS-coronavirus (published in 2015, before the COVID-19 pandemic). The results showed that information about the infection was relatively low (44%). Despite this, the author concluded that dental students had a reasonable understanding, although it was lower compared to the present study. This difference may be due to the increased coverage in the media and on social platforms surrounding the recent COVID-19 pandemic compared to the period before it [22].

In contrast, the pharmacy students in the current study demonstrated excellent knowledge of various aspects of COVID-19, including its virology, transmission methods, signs and symptoms, prevention, treatment, and outcomes. Approximately 96.4% were aware that a vaccine was not yet available, and 93.6% knew how the virus spread. This high level of awareness can be credited to extensive government and educational campaigns directed at the public, particularly those in the healthcare field [23].

Additionally, the majority of students cited social media (52%) and the WHO website (25.8%) as their primary sources of information, which may explain the reason that there was no important difference in information when comparing students by grade level (data not shown). This suggests that for COVID-19, students' knowledge largely comes from non-educational sources.

In the present study, 62.2% of the students understood the reason the virus is referred to as "novel coronavirus," while 62.3% knew the origin of the virus's name. Furthermore, 71.7% were aware of the virus's lifespan in various environments. These results reflect a strong knowledge of virology, which could stem from the comprehensive virology courses provided early in their academic programs. Additionally, final-year students (in their fourth and fifth years) undergo clinical training through community pharmacy and hospital placements, further enhancing their understanding.

Regarding attitudes, the majority of students (86.2%) expressed concern about the virus infecting their close contacts and family. Additionally, 66.7% felt the government had not implemented adequate measures to control the virus, with 68% believing insufficient actions had been taken to stop its spread. This growing negative perception has become more pronounced as the virus spread more widely in subsequent months. Moreover, 66.7% of respondents shared concerns about the government's handling of the virus. Regarding the information available in Iraqi society about COVID-19, 27.5% felt it was inadequate, while 50.7% were neutral. These views could serve as a predictor for the virus's widespread transmission.

As for students' attitudes toward preventive measures, most (89.1%) believed that active involvement in WHO-recommended precautions would reduce transmission, and 84.8% stated they would get vaccinated if a vaccine became available. This indicates that students are eager to engage in efforts to control the infection while feeling that the government has not sufficiently mobilized resources.

Conclusion

Pharmacy students demonstrated a strong understanding of the medical aspects of COVID-19 and displayed solid knowledge of the virus's underlying science. However, they held a negative view regarding the actions taken by official institutions to prevent the transmission of the infection.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: Informed consent was obtained from all participants involved in the research.

The research was approved by the Baghdad College of Medical Science (Ref#017/3-2020). Before starting the survey, we asked participants to provide their consent, assuring them that their personal information would remain confidential.

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